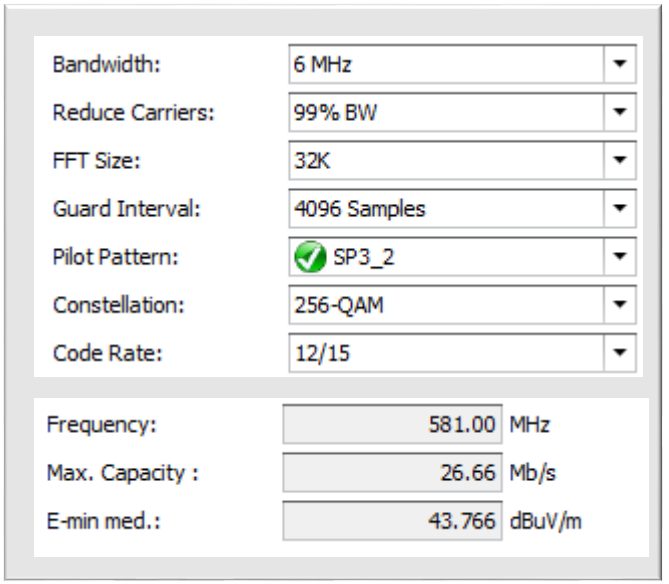
Smart Spectrum Solutions

LS telcom – June 23, 2017

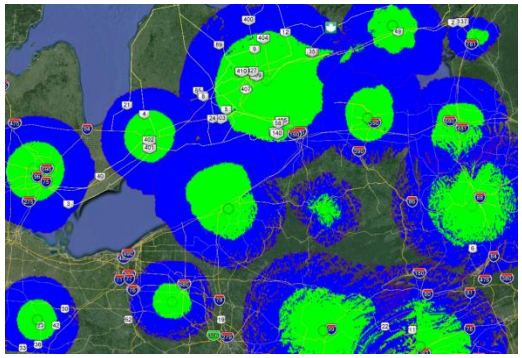
Next Generation Broadcast – ATSC 3.0

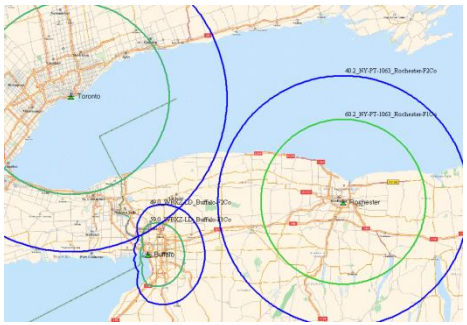
- FCC NPRM Opens the Door for the Next Generation
- OFDM Based Technology
- Single Frequency Network (SFN) Operations
  - Co-Channel Repeaters / Transposers
- New Content Delivery, Service Combinations
- Planning Must Include the Technology Specific (RF) Transmission Analysis
  - Propagation, Timing, Interference
  - Modulation, Capacity
- Accurate Testing of Pattern Measurements

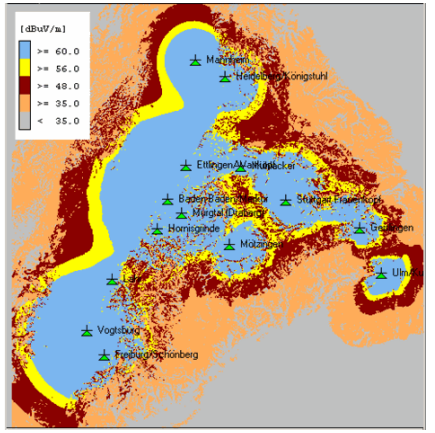


LS telcom Solutions - CHIRplus_BC

- Planning and Coordination of Terrestrial Broadcasting services
  - ATSC, ATSC 3.0, NTSC, PAL, DVB-T/T2 (-H), ISDB-T FM (HD Radio), T-DAB (-DMB), LF/MF, HF, DRM(+)
  - Other Services in the Broadcasting Bands (e.g. LTE or Aeronautical Compatibility)
  - Powerful Database System
  - GIS and Graphical User Interface
  - Field Strength and Interference Prediction
  - Support of International Frequency Plans (RJ81, GE84, ST61, GE75, GE06 …)
  - OET-69 Compatibility Check
  - Contour Based Calculations
  - Coordination Functions and Macros
  - Network Planning and Optimization
  - Frequency Planning (Frequency Scan)
  - Population Analysis

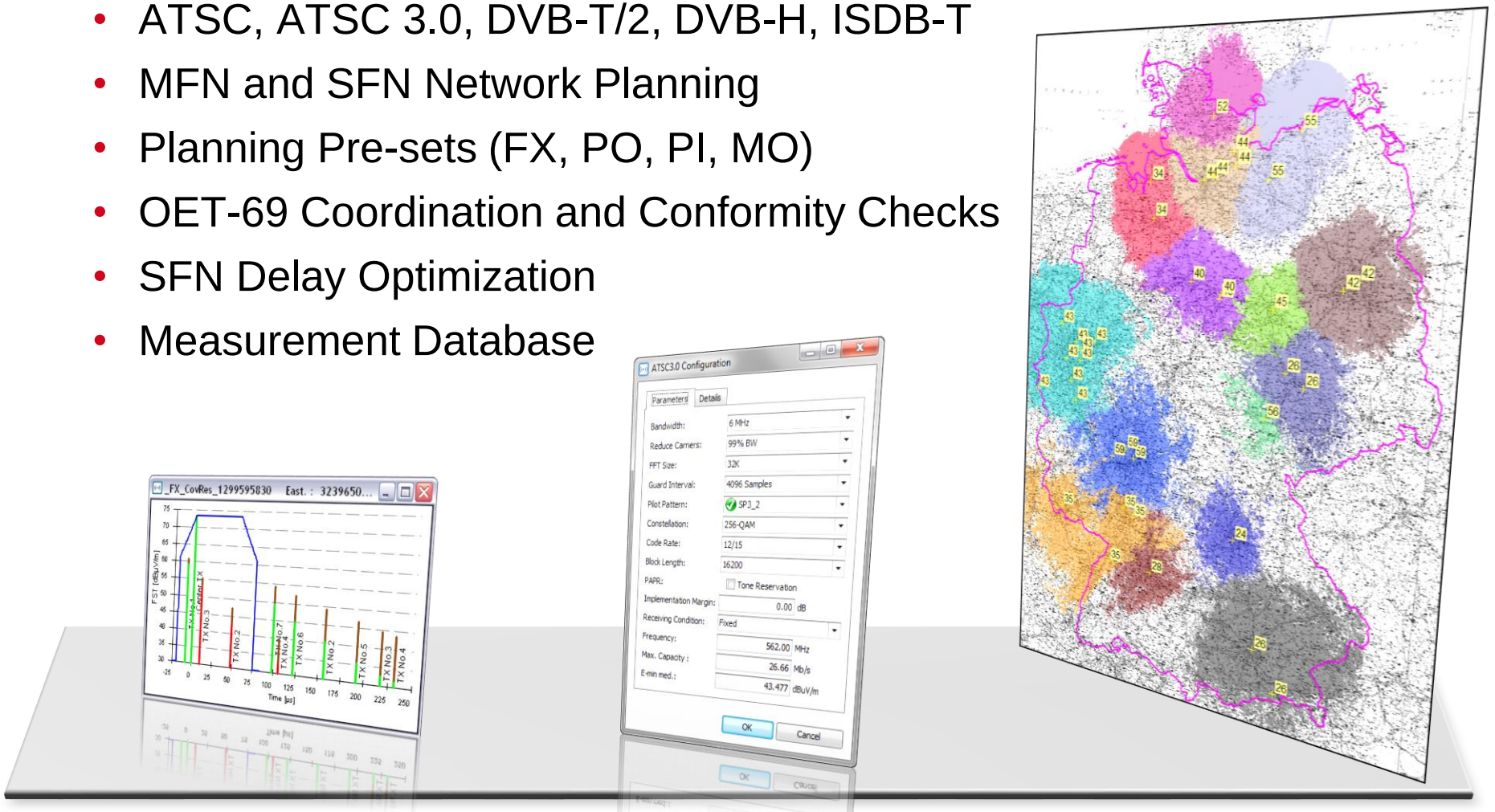






CHIRplus_BC Digital Planning

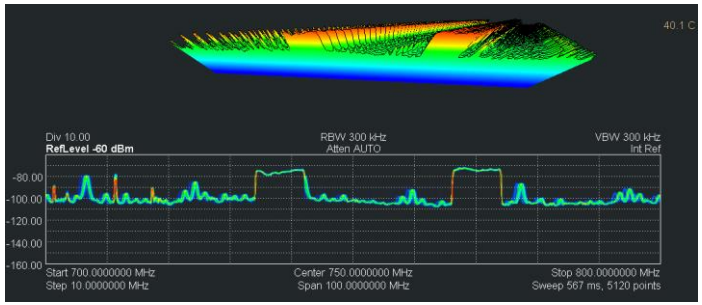
- Covering standards for digital broadcast and mobile TV
  - ATSC, ATSC 3.0, DVB-T/2, DVB-H, ISDB-T
  - MFN and SFN Network Planning
  - Planning Pre-sets (FX, PO, PI, MO)
  - OET-69 Coordination and Conformity Checks
  - SFN Delay Optimization
  - Measurement Database



Unmanned Aircraft Systems (UAS) Broadcast Measurement

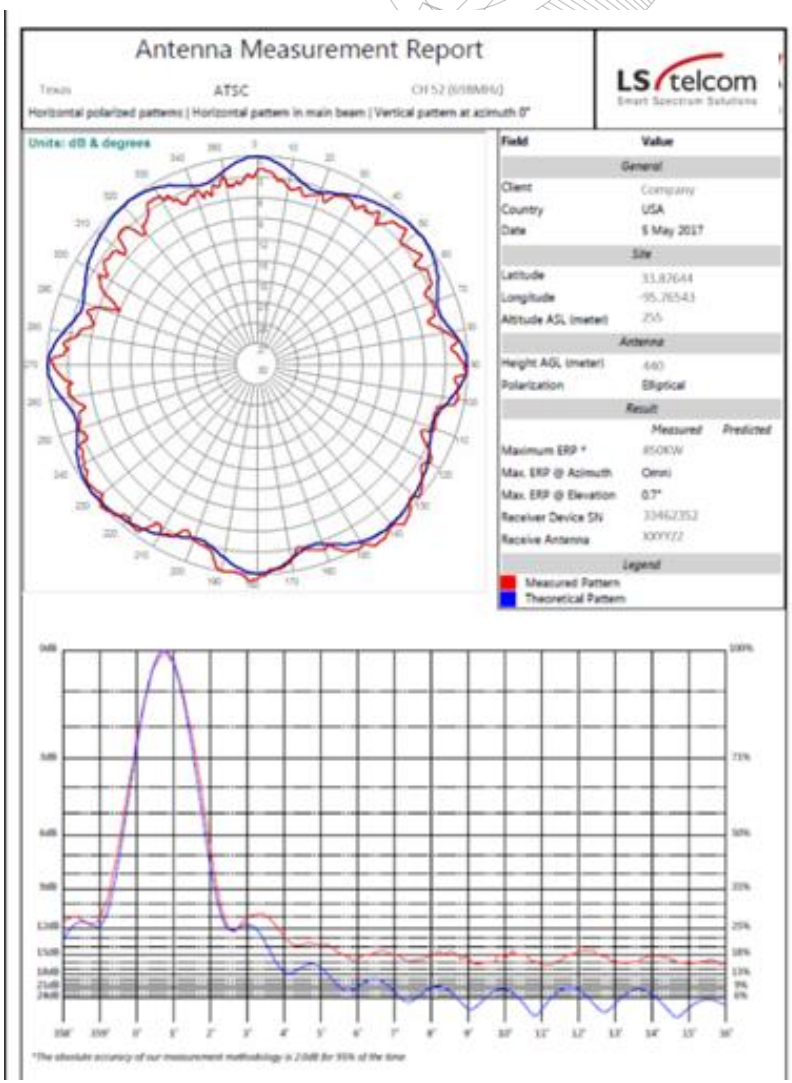
UAS Based Solutions

- Dedicated Measurement Sensor & Data Processor (Real-time Download)
- High Resolution Flight Positioning and Orientation Sensors
- Autopilot Capabilities
- Calibrated Measuring Antennas
- Data Analysis Application Package
- Specific RF Shielding



Antenna Pattern Measurements

- On-site absolute antenna radiation pattern measurements
  - Horizontal (HRP) and Vertical (VRP) Radiation Patterns
  - Beam Tilt, Null Fill
  - Absolute ERP
  - For all typical broadcast bands and technologies (FM, DAB, DTT, ...)
- Validation of installation during SAT
- Detection of errors
- Antenna installation optimization
  - Tilt, Azimuth)
- Effect of obstacles at same location
- Compatible with planning tools



Cedar Hill – May 2017

- UAS Broadcast Measurement of Broadband Antenna at Cedar Hill Site
- H-Pol and V-Pol Measured for two television channels preparing for repack
- Two Day Measurement provided rapid validation of equipment performance
- Operated under Part 107 Waiver

Summary

- OTA Broadcasters are Facing Unprecedented Network Changes in the Next Several Years
- The deployment of ATSC 3.0 will introduce new challenges for SFN operations
- Accurate Planning and Measurement are key to managing interference

- LS telcom is Uniquely Positioned to Support OTA Broadcasters
  - State-of-the-Art Measurement and Planning including both Ground and Airborne Capabilities
  - Global Leaders in Broadcast Planning with Targeted Experience in Channel Repacking and Technology Transition
  - Global Experience in Digital Broadcast Evolution to SFN Based Networks

Thank You

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